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FALLBROOK OAKS
PRELIMINARY NOISE STUDY
COUNTY OF SAN DIEGO, CALIFORNIA

June 2, 2008

JN: 05890-03
JL:AS

TM 5449 ER 05-02-029

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FALLBROOK OAKS
PRELIMINARY NOISE STUDY
COUNTY OF SAN DIEGO, CALIFORNIA

1.0 EXECUTIVE SUMMARY

This noise study has been completed to determine the noise impacts associated with the development of the proposed Fallbrook Oaks Development. The project site is proposed to be developed with 18 single family residential lots. The project site is located northwest of Reche Road in the Fallbrook community of the County of San Diego.

The purpose of this noise assessment is to evaluate the noise impacts for the project study area and to recommend noise mitigation measures, if necessary, to minimize the potential project impacts. Preliminary exterior and interior noise requirements for tentative tract map approval are presented in this report.

The results of this analysis indicate that the future vehicle noise from Reche Road is the principal source of community noise that will impact the site. The only other major roadway in the vicinity of the proposed project site is Interstate 15 (I-15) located more than 2,000-feet from the project. Therefore, I-15 is considered to be an insufficient noise generator and was not included in the modeling. Based on the future buildout traffic projections, the proposed site will not experience unmitigated exterior noise levels in excess of the County of San Diego 60 dBA CNEL noise standards for transportation related noise impacts. To minimize traffic noise impacts, the project should provide the following noise mitigation measures summarized below:

Exterior Noise Mitigation

The noise levels at Lot 18 will meet the County of San Diego 60 dBA CNEL standard without mitigation.

Interior Noise Mitigation

- Provide a "windows closed" condition requiring a means of mechanical ventilation (e.g. air conditioning) for the second floor of Lot 18.
- To minimize the potential interior noise impacts, the second floor of Lot 18 should be provided with weather-stripped solid core exterior doors and exterior wall/roof assembles should be free of cut outs and openings.
- Provide upgraded windows for the second floor of Lot 18.

A final noise study for the second floor of Lot 18 should be prepared prior to obtaining building permits for the project. This report would finalize the noise requirements based upon actual building design specifications. Preliminary exterior and interior noise requirements for tentative tract map approval are presented in this report.

2.0 INTRODUCTION

This preliminary noise study outlines the project, provides basic information regarding the fundamentals of traffic noise, describes local noise guidelines, provides the study methods and procedures for traffic noise analysis, and evaluates the future exterior and interior noise environments.

This report presents the results of a preliminary noise study for the Fallbrook Oaks Development. The proposed site includes 18 single family lots. The general location of the project is shown on the Location Map, Exhibit 2-A. The proposed project is located northwest of Reche Road in the Fallbrook community of the County of San Diego. The site plan used for this analysis is shown on Exhibit 2-B.

Included in the report is a discussion of the expected exterior community noise environment and recommendations for control of the noise impacts for exterior noise sensitive land uses. In the following sections, noise exposures expected within the planned site are reviewed and compared to the applicable noise standards.

EXHIBIT 2-A
LOCATION MAP

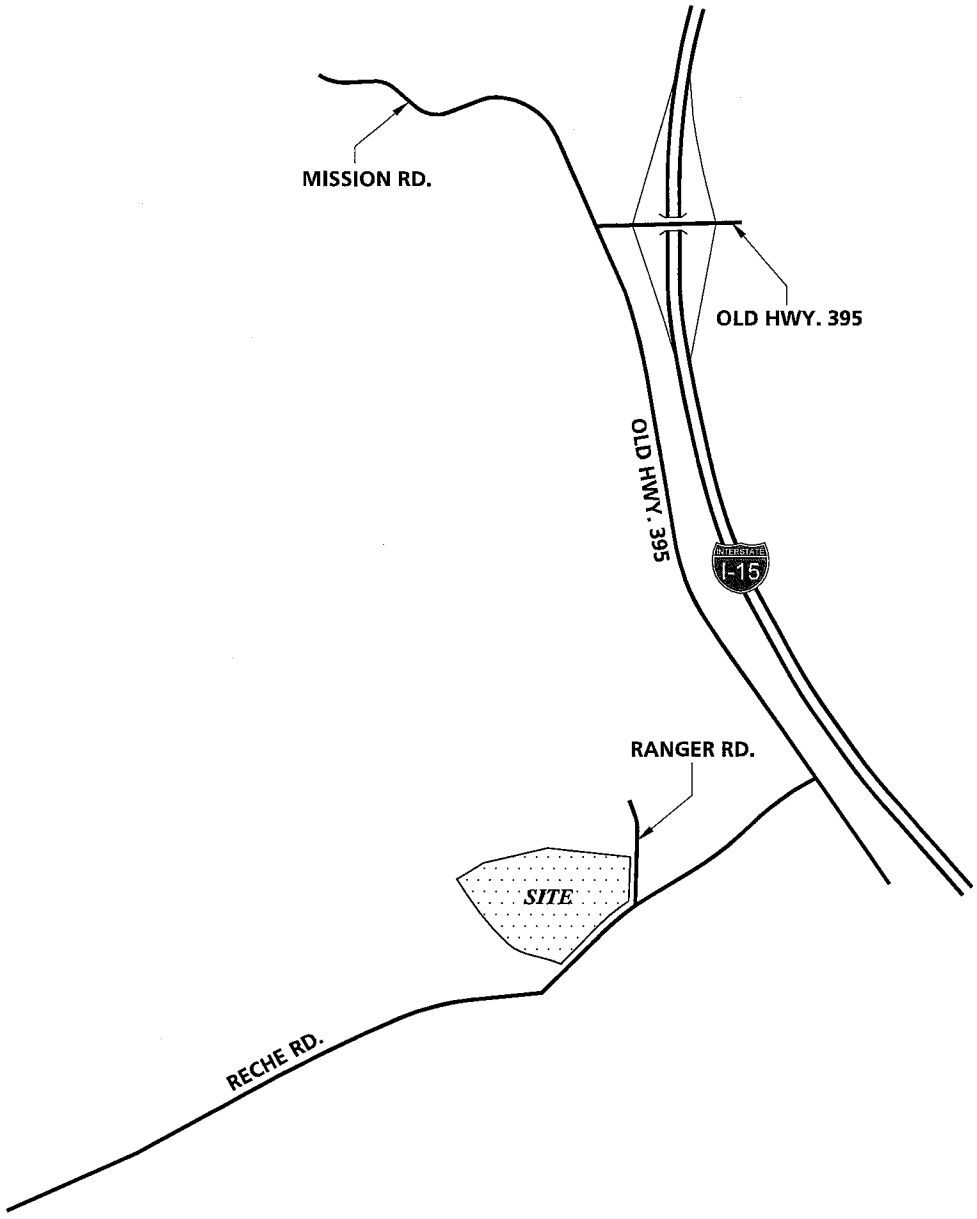
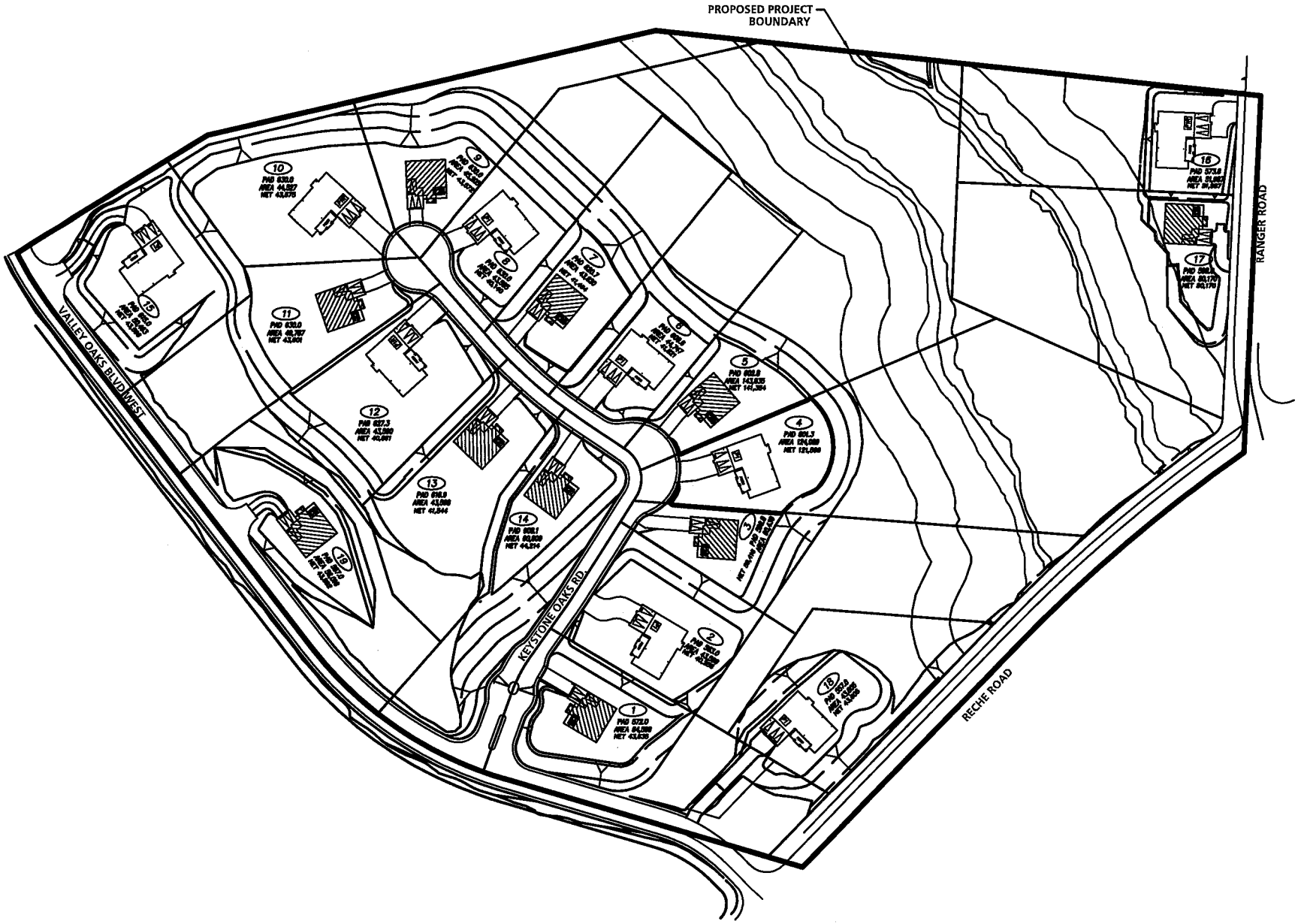


EXHIBIT 2-B

SITE PLAN



3.0 NOISE FUNDAMENTALS

Noise has been simply defined as "unwanted sound". Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear.

3.1 Noise Descriptors

Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (Leq) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. The peak hour Leq is the noise metric used by Caltrans for all traffic noise impact analysis.

The Community Noise Equivalent Level (CNEL) is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time of day corrections require the addition of five decibels to sound levels in the evening from 7 p.m. to 10 p.m., and the addition of ten decibels to sound levels at night between 10 p.m. to 7 a.m. These additions are made to the sound levels at these time periods because during the evening and night hours, with the decrease in overall amount and loudness of noise generated, when compared to daytime hours, there is an increased sensitivity to sounds. For this reason the sound appears louder and it is weighted accordingly. The County of San Diego relies on the CNEL noise standard to assess transportation related impacts on noise sensitive land uses.

3.2 Traffic Noise Prediction

The level of traffic noise depends on the three primary factors: (1) the volume of the traffic, (2) the speed of the traffic, and (3) the number of trucks in the flow of traffic. Generally, the loudness of traffic noise is increased by heavier traffic volumes, higher speeds and greater number of trucks. Vehicle noise is a combination of the noise produced by the engine, exhaust and tires.

Because of the logarithmic nature of traffic noise levels, a doubling of the traffic noise (acoustic energy) results in a noise level increase 3 dBA. Based on the FHWA community noise assessment criteria this change is "barely perceptible". In other words, doubling the traffic volume (assuming that the speed and truck mix do not change) results in a noise increase of 3 dBA. The truck mix on a given roadway also has a significant effect on community noise levels. As the number of heavy trucks increases and becomes a larger percentage of the vehicle mix, adjacent noise levels increase.

3.3 Noise Control

Noise control is the process of obtaining an acceptable noise environment for a particular observation point or receiver by controlling the noise source, transmission path, receiver or all three. This concept is known as the source-path-receiver concept. In general, noise control measures can be applied to any and all of these three elements and a noise barrier is most effective when placed close to the noise source or receiver.

3.4 Ground Absorption

To account for the ground-effect attenuation (absorption), two types of site conditions are commonly used in traffic noise models, soft site and hard site conditions. Soft site conditions account for the sound propagation loss over

natural surfaces such as normal earth and ground vegetation. A drop-off rate of 4.5 dBA per doubling of distance is typically observed over soft ground with landscaping, as compared with a 3.0 dBA drop-off rate over hard ground such as asphalt, concrete, stone and very hard packed earth. To predict the worse-case future noise environment, hard site conditions were used for all floors in this analysis based on the topography in the site area and the monitoring results.

4.0 COUNTY OF SAN DIEGO NOISE STANDARDS

The County of San Diego addresses two separate types of noise sources through the CEQA process: (1) mobile, and (2) stationary. In the context of this noise analysis, the noise levels associated with the proposed Fallbrook Oaks Development are regulated by the County of San Diego noise guidelines for determining significance. Those guidelines are summarized below and provided as Appendix "A".

4.1 Noise Element Criteria

The County of San Diego has adopted interior and exterior noise standards as part of the County's Noise Element of the General Plan for assessing the compatibility of land uses with transportation related noise impacts. For assessing noise impacts to noise sensitive land uses, the County requires an exterior noise level of less than 60 dBA CNEL for outdoor living areas and an interior noise standard of 45 dBA CNEL.

4.2 Noise Ordinance Criteria

Section 36.404 of the San Diego County noise ordinance provides performance standards and noise control guidelines for determining and mitigating non-transportation, or stationary, noise source impacts to residential properties. The purpose of the noise ordinance is to protect, create and maintain an environment free from noise and vibration that may jeopardize the health or welfare, or degrade the quality of life.

According to the stationary source exterior noise standards, no person shall operate any source of sound at any location within the County or allow the creation of any noise on a property which causes the noise levels to exceed the exterior noise limits at the property boundary within all zones. The noise ordinance sets an exterior noise limit for noise sensitive land uses adjacent to the property zoned S-88 of 50 dBA Leq for daytime hours of 7 a.m. to 10 p.m. and 45 dBA Leq during the noise sensitive nighttime hours of 10 p.m. to 7 a.m.

5.0 NOISE LEVEL MEASUREMENTS

To determine the existing noise level environment and to assess potential noise impacts, measurements were taken at a worse-case location adjacent to Reche Road. The noise measurement was recorded by Urban Crossroads, Inc. between the hours of 3:45 p.m. and 4:00 p.m. on April 28, 2008. Appendix "B" includes study area photos and Appendix "C" includes a summary of the monitoring data.

5.1 Measurement Procedure and Criteria

Noise measurements were taken using a Larson-Davis Model LxT Type 1 precision sound level meter, programmed, in "fast" mode, to record noise levels in "A" weighted form. The sound level meter and microphone were mounted on a tripod, five feet above the ground and equipped with a windscreen during all measurements. The sound level meter was calibrated before and after the monitoring using a Larson-Davis calibrator, Model CAL 200.

5.2 Noise Measurement Locations

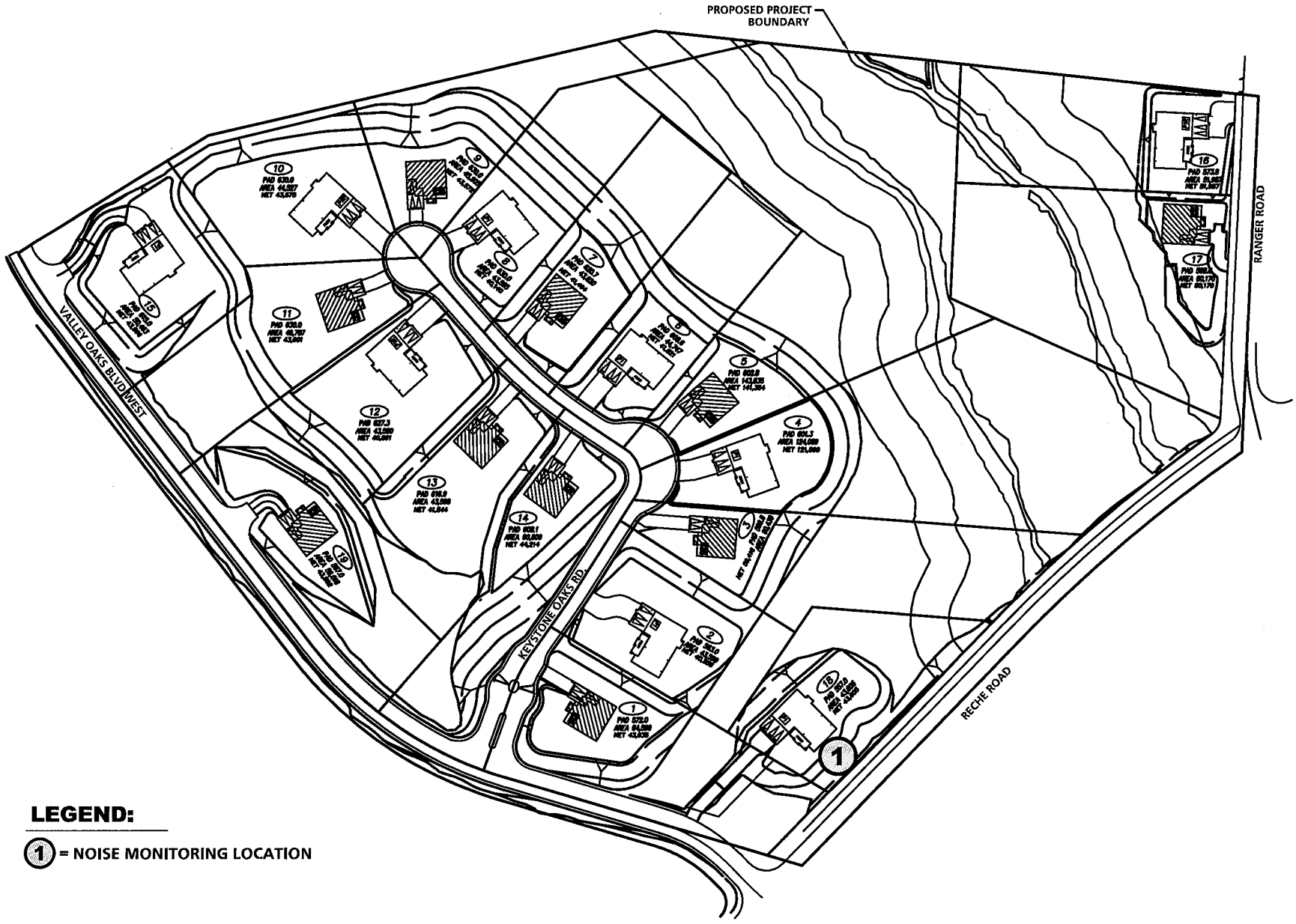
The noise monitoring location was selected based on the respective impact potential. The site is currently vacant and is surrounded on all sides by residential and vacant uses. Monitoring location 1 was placed at the proposed location of Lot 18, approximately 65 feet from the centerline of Reche Road. The noise monitoring location is provided in Exhibit 5-A.

5.3 Noise Measurement Results

The results of the noise level measurements are presented in Table 5-1. The noise measurements were monitored for a minimum time period of 10 minutes. The existing ambient Leq noise levels measured in the area of the project during the afternoon hour were found to be 63.0 dBA Leq at monitoring location 1. The project site is mostly vacant and the existing noise levels in the project area consist primarily of vehicle traffic from Reche Road.

EXHIBIT 5-A

NOISE MONITORING LOCATION



LEGEND:

(1) = NOISE MONITORING LOCATION

N

TABLE 5-1

EXISTING (AMBIENT) NOISE LEVEL MEASUREMENTS[1]

OBSERVER LOCATION[2]	DESCRIPTION[3]	TIME OF MEASUREMENT	PRIMARY NOISE SOURCE	MEASURED NOISE LEVELS (dBA Leq)
1	65 feet from the centerline of Reche Road at the proposed location of Lot 18	3:45 PM	Vehicle noise from Reche Road	63.0

[1] Noise measurement taken for a minimum period of 10 minutes by Urban Crossroads Inc on April 28, 2008

[2] See Exhibit 5-A for the location of the monitoring site, and Appendix "B" for Study Area Photos.

[3] Weather Conditions on April 28, 2008: Temperature =95°F; Wind = 1-2 mph.

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6.0 METHODS AND PROCEDURES

The following section outlines the methods and procedures used to model and analyze the future noise environment.

6.1 FHWA Traffic Noise Prediction Model

The expected roadway noise impacts from Reche Road were projected using Sound32, Caltrans' version of the FHWA's STAMINA 2.0/OPTIMA Traffic Noise Prediction Model. Sound32 is a peak hour Leq based traffic noise prediction model. The results of this analysis are based on the Caltrans *Highway Design Manual* California Vehicle Noise Emission Levels (Calveno Curves). These curves more accurately reflect motor vehicle noise characteristics in the project area, and use of the Calveno curves is required by Section 1103.1 of the *Highway Design Manual.* The key input parameters, which determine the projected impact of vehicular traffic noise, include the lane travel speed, the percentages of automobiles, medium trucks and heavy trucks in the roadway volume, the site conditions ("hard" or "soft") and the peak hour traffic volumes.

All roadways were modeled with hard site conditions to predict the worse case future noise environment for both first and second floor receptors based on the topography in the area and the monitoring results.

Since the Sound32 traffic noise model calculates the peak hour Leq dBA noise level, it is necessary to convert the results into CNEL values. The Leq to CNEL calculations are based on a typical vehicle distribution of over a twenty-four hour period with the appropriate noise penalties for the evening and nighttime periods. For the purpose of this analysis 80% of all vehicles were assigned during the daytime hours of 7 a.m. to 7 p.m., 7% during the evening hours of 7 p.m. to 10 p.m. and 13% during the nighttime hours of 10 p.m. to 7 a.m. Section N-2231 of the Caltrans Technical Noise Supplement outlines the procedures to calculate the CNEL values using the peak hour Leq.

6.2 Sound 32 Model Setup

To obtain the necessary coordinate information required by the Sound32 traffic noise prediction model, input data was taken using the grading plans. The preliminary grading plans provided by Morrison Engineering received on May 8, 2008 were used to identify the relationship between the roadway centerline elevation, the pad elevation and the centerline distance to the noise barrier, the backyard observer and at the building façade to predict the future noise environment. For modeling purposes, traffic was consolidated into a single lane located along the centerline of the road. Lane consolidation is considered an acceptable practice since the amount of error introduced by this simplification is negligible. The lanes were then subdivided into a series of contiguous segments for analysis. The nodes points on each road segment were then manually assigned an elevation using either the roadway centerline elevation or the elevation provided on the vertical roadway profile. For the purpose of this analysis, the roadway segments extend a minimum of 500 feet beyond any observer location. No grade correction or calibration (according to Caltrans Policy TAN-02-01 dated January 17, 2002) were included as part of the Sound32 traffic noise prediction model analysis.

The traffic noise analysis was only completed for Lot 18 because it lies nearest to Reche Road. To assess the study noise impacts with the development of the proposed project the outdoor observer located in the noise sensitive land use area of Lot 18 was placed five (5) feet above the pad elevation and approximately ten (10) feet from the top of slope. The first floor observer was placed five (5) feet above the proposed finished floor elevation with the second floor observer located fifteen (15) feet above the proposed finished floor elevation.

6.3 Traffic Noise Prediction Model Inputs

The roadway parameters including the average daily traffic volumes and vehicle speeds used for this study are presented in Table 6-1. To assess the peak hour traffic noise conditions, 10% of the ADT was used for the study area roadway. Table

TABLE 6-1

ROADWAY PARAMETERS

CONDITION	(ADT)[1]	PEAK HOUR TRAFFIC VOLUMES[2]			MODELED/ OBSERVED VEHICLE SPEED[3]
		AUTOS	MEDIUM TRUCKS	HEAVY TRUCKS	
RECHE ROAD					
EXISTING	6,000	570	18	12	40
BUILDOUT	11,000	1,045	33	22	45

[1] Average Daily Traffic (ADT) for buildout condition was based on SANDAG 2030 conditions, existing ADT was based on the traffic counts taken by Urban Crossroads Inc. on April 28, 2008.

[2] Worst case scenario assuming 10% of the ADT.

[3] Vehicle speeds were observed in the study area.

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6-2 presents the hourly traffic flow distribution (vehicle mix) used for this analysis. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the FHWA Model. The future traffic noise model utilizes an observed vehicle mix of 95% Autos, 3% Medium Trucks and 2% Heavy Trucks for Reche Road. It should be noted: the only other major roadway in the vicinity of the proposed project site is I-15 located more than 2,000-feet from the project. Therefore, I-15 is considered to be an insufficient noise generator and was not included in the modeling.

6.4 Sound32 Modeled Scenarios

The existing conditions were modeled to compare against the noise measurements described in Section 5 of this report. It is expected that the primary source of noise impacts to the site will be traffic noise from Reche Road. I-15 is located more than 2,000-feet from the project. Therefore, it is not anticipated to cause any noise impacts to the project site. The Buildout scenario includes the future Year 2030 traffic volume forecasts provided by the San Diego Association of Governments (SANDAG). An estimated traffic speed of 45 mph was utilized for Reche Road based upon the roadway classification of light collector.

TABLE 6-2

HOURLY TRAFFIC FLOW DISTRIBUTION[1]

MOTOR-VEHICLE TYPE	DAYTIME (7 AM TO 7 PM)	EVENING (7 PM TO 10 PM)	NIGHT (10 PM TO 7 AM)	TOTAL % TRAFFIC FLOW
RECHE ROAD				
Automobiles	80.0%	7.0%	13.0%	95.00%
Medium Trucks	80.0%	7.0%	13.0%	3.00%
Heavy Trucks	80.0%	7.0%	13.0%	2.00%

[1] Vehicle mix used for Reche Road observed during site visit

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7.0 ON-SITE NOISE ANALYSIS

Using the FHWA traffic noise prediction model and the input parameters described in Section 6 of this report, calculations of the expected future noise impacts were completed. An analysis has been performed to determine the acoustical shielding which may be used to reduce the expected roadway noise impact for the affected noise sensitive land uses. Key input data for these barrier performance equations include the relative source-barrier-receiver horizontal separations, the relative source-barrier-receiver vertical separations, the typical noise source spectra and the barrier transmission loss. The exterior noise levels were analyzed for the existing conditions and buildout conditions.

7.1 Existing Conditions

Section N-5440 of the Caltrans Technical Noise Supplement provides detailed procedures for calibrating the Sound32 traffic noise prediction model to actual noise level measurements. The comparison is made to ensure the predicted traffic noise levels accurately reflect the actual measured noise levels. Section N-5460 suggests that model calibration should not be performed when calculated and measured noise levels agree within 1 dBA. Differences of 3.0 to 4.0 dBA may routinely be calibrated.

The modeled existing noise levels are shown on Table 7-1. Monitoring locations were modeled to compare with the noise monitoring location presented in Table 5-1. The model is predicting the noise levels within 0.3 dBA when using hard-site conditions. Therefore, all roadways were modeled with hard site conditions to predict the worse case future noise environment for both first and second floor receptors. The calibration factor based on the noise measurement data described in Chapter 5 was not included as part of the buildout analysis. The model input parameters for calibration can be seen in Appendix "D".

TABLE 7-1

EXISTING NOISE LEVELS (MODELED)

RECEPTOR	RECEPTOR DESCRIPTION	dBA Leq	dBA CNEL
1	Monitoring Location 1	63.3	63.4

[1] Noise monitoring locations included in the model for existing conditions to compare with the measured noise results presented in Table 5-1.

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7.2 Buildout Scenario Exterior Noise Analysis

The buildout analysis was modeled assuming future Year 2030 traffic volumes along Reche Road. An estimated traffic speed of 45 mph was utilized for Reche Road based upon the roadway classification of light collector. The traffic noise analysis was only completed for Lot 18 because it lies nearest to Reche Road. The top of slope for Lot 18 was also included in the model for this scenario. The exterior noise level will meet the County of San Diego 60 dBA CNEL standard for residential developments at Lot 18 without mitigation. The modeled observer location for the project are presented in Exhibit 7-A. The result of the unmitigated noise sensitive land use is shown in Table 7-2.

7.3 Buildout Scenario Interior Noise Analysis

In order to determine the noise levels at the second floor of Lot 18, the building façade was modeled. The second floor building façade level for Lot 18 is also provided in Table 7-2. The noise level at the second floor of Lot 18 was found to be above the General Plan Noise Element Standard, of 60 dBA CNEL. Therefore, interior mitigation for this area is required to obtain an interior level of 45 dBA CNEL. It should be noted; interior noise levels can easily be obtained with typical building construction methods and the following recommendations:

- Provide a "windows closed" condition requiring a means of mechanical ventilation (e.g. air conditioning) for the second floor of Lot 18.
- Provide upgraded windows for the second floor of Lot 18.

A final noise study shall be prepared prior to obtaining building permits for the second floor of Lot 18. This report would finalize the noise requirements based upon precise grading plans and actual building design specifications. The Sound32 input decks for first and second floor future year 2030 conditions are provided in Appendix "E".

EXHIBIT 7-A

MODELED OBSERVER LOCATION

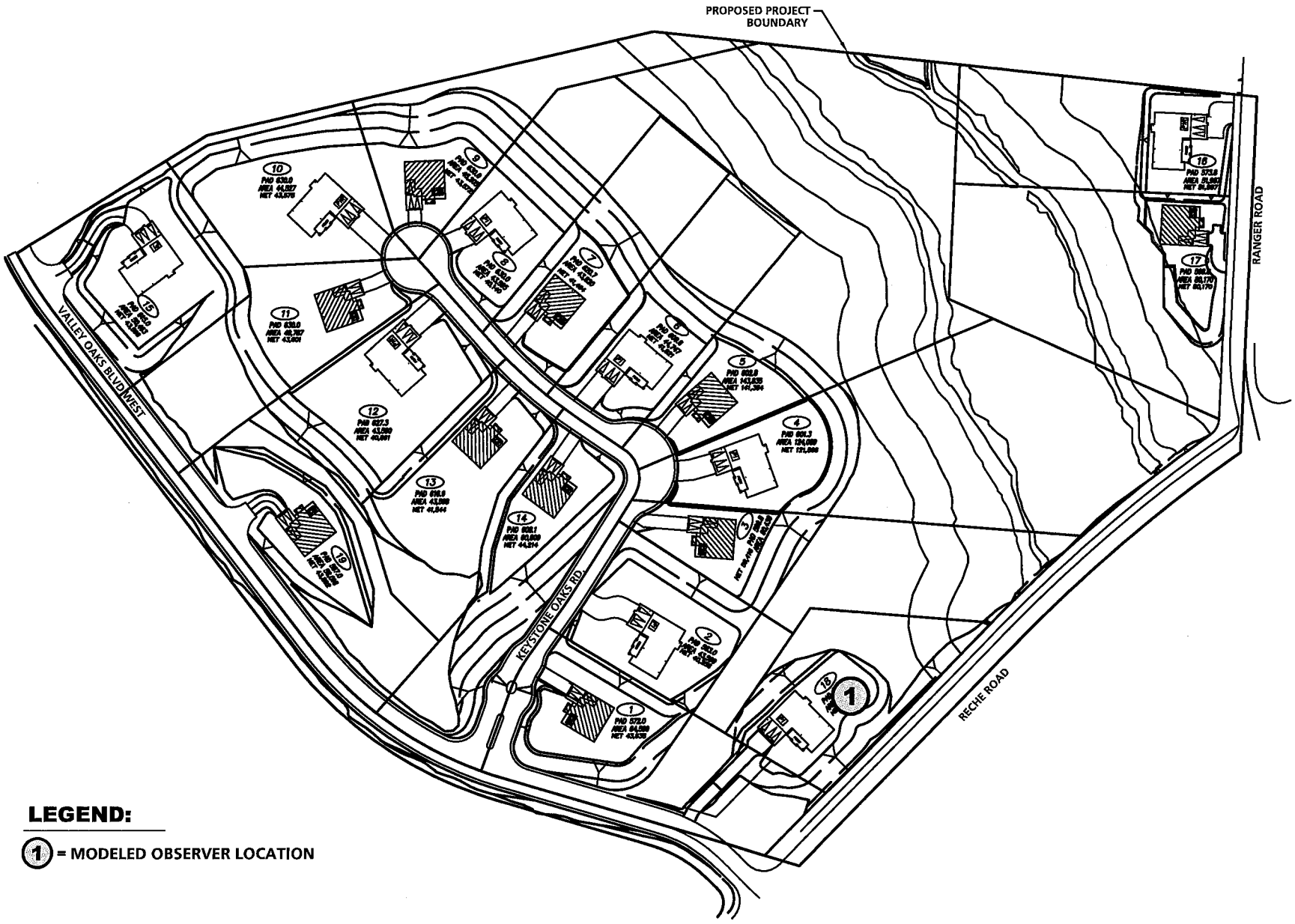

TABLE 7-2

BUILDOUT CONDITIONS EXTERIOR NOISE LEVELS (dBA CNEL)

RECEPTOR NUMBER	RECEPTOR LOCATION	UNMITIGATED GROUND FLOOR EXTERIOR NOISE LEVEL	SECOND FLOOR UNMITIGATED EXTERIOR NOISE LEVEL
1	LOT 18	58.6	65.2

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